

C++ File I/O

Reading and Writing Files

5 Exercises — `ofstream`, `ifstream`, and Formatted Data

Topics Covered	
★★■	Writing files — <code>ofstream</code> , <code>is_open</code> , formatted output
★★■	Reading files — <code>ifstream</code> , <code>getline</code> , counting lines
★★★	Combined I/O — copy, data round-trips, error handling

File I/O lets your program persist data between runs and share results with other tools. `std::ofstream` writes, `std::ifstream` reads — always check `is_open()` and always close when done.

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- 01. Write to a File (File I) ★★■
- 02. Write Two-Column Plot Data (File I) ★★■
- 03. Count Lines in a File (File I) ★★■
- 04. Copy a File (File I) ★★★
- 05. Write and Read a Number List (File I) ★★★

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Write a program that creates a file called *hello.txt* and writes the line **Hello, file!** into it. After writing, print **File written successfully.** to the console.

Include `<fstream>`. Open the file with `std::ofstream out("hello.txt");` and write to it just like `std::cout`. Always check that the file opened with `out.is_open()`.

```
File written successfully.
[hello.txt contains: Hello, file!]
```

Write a program that generates a table of values for the function $y = \sin(x)$ and saves them to a file called *sine_data.txt* ready for plotting.

After writing, print **Wrote N rows to sine_data.txt** to the console.

Include `<cmath>` for `std::sin` and define `pi` as `4 * std::atan(1.0)`. Use `std::fixed << std::setprecision(6)` from `<iomanip>` to format the output.

```
Wrote 63 rows to sine_data.txt
[sine_data.txt:]
# x y
0.000000 0.000000
0.100000 0.099833
...
```

★★■

Open a file called *data.txt* and count how many lines it contains. Print the result as: **Lines: N**. If the file cannot be opened, print an error message.

Use `std::getline` in a while loop and increment a counter each time it successfully reads a line.

Lines: 5



Read the name of a source file and a destination file from the user. Copy every line from the source into the destination file. Print **Copied N lines.** when done, or an appropriate error if either file cannot be opened.

Open one `std::ifstream` for reading and one `std::ofstream` for writing at the same time. Use `std::getline` to read and `out << line << "\n"` to write.

```
Source file: input.txt
Dest file: output.txt
Copied 5 lines.
```

Write and Read a Number List

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Topic: File I/O / ofstream / ifstream / Data

Description

Part 1 — Write: ask the user for 5 integers and save them to *numbers.txt*, one per line.

Part 2 — Read: re-open *numbers.txt*, read the numbers back, compute their sum and average, and print both.

Hint

Close (or let go out of scope) the ofstream before opening the ifstream. Use `in >> num` in a while loop to read integers from the file.

Expected Output

```
Enter 5 numbers: 4 8 15 16 23
Saved to numbers.txt
Sum: 66
Average: 13.2
```

Your Solution